

WHAT IS CLAIMED IS

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1. A magneto-resistive magnetic sensor,  
comprising:

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A  
10 a magneto-resistive structure changing a  
resistance thereof in response to an external magnetic  
field,

a cap layer, provided on a top surface of  
said magneto-resistive structure;

a pair of magnetic regions disposed at both  
lateral sides of said magneto-resistive structure,  
15 said magnetic regions having a magnetization pointing  
in a common direction;

a pair of electrodes provided on said pair  
of magnetic regions so as to oppose with each other  
across said magneto-resistive structure, said  
20 electrodes having respective overhang parts extending  
over said magneto-resistive structure so as to oppose  
with each other with a gap therebetween,

wherein each of said overhang parts covers  
said cap layer on said magneto-resistive structure in  
25 such a state that an oxidation-resistant conductive  
layer is interposed between said cap layer and said  
overhang part.

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2. A magneto-resistive magnetic sensor as  
claimed in claim 1, wherein said oxidation-resistant  
conductive layer is formed of a metal selected from  
35 the group consisting of Au, Pt and Cu.

3. A magneto-resistive magnetic sensor as claimed in claim 1, wherein said oxidation-resistant conductive layer has a thickness larger than about 1nm.

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4. A magneto-resistive magnetic sensor as claimed in claim 1, wherein said oxidation-resistant conductive layer has a thickness of larger than about 3nm.

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5. A magneto-resistive magnetic sensor as claimed in claim 1, wherein said oxidation-resistant conductive layer has a thickness of smaller than about 10nm.

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6. A magneto-resistive magnetic sensor as claimed in claim 1, wherein said cap layer comprises Ta.

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7. A magneto-resistive magnetic sensor as claimed in claim 1, wherein said magneto-resistive structure comprises an anti-ferromagnetic pinning layer, a ferromagnetic pinned layer having an exchange coupling with said anti-ferromagnetic pinning layer, a ferromagnetic free layer, and a non-magnetic

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separation layer interposed between said ferromagnetic pinned layer and said ferromagnetic free layer.

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8. A method of fabricating a magneto-resistive magnetic sensor, comprising the steps of:

forming a magneto-resistive structure on a  
10 substrate, said magneto-resistive structure changing a resistance thereof in response to an external magnetic field;

depositing a cap layer on a top surface of said magneto-resistive structure;

15 depositing an oxidation-resistant conductive layer on a top surface of said cap layer, said magneto-resistive structure, said cap layer and said oxidation-resistant conductive layer forming thereby a magneto-resistive layer;

20 patterning said magneto-resistive layer by applying a lithographic process, to form a magneto-resistive region on said substrate;

depositing a ferromagnetic layer of said substrate to form a pair of domain control regions at  
25 both lateral sides of said magneto-resistive region;

depositing an electrode layer on said substrate such that said electrode layer covers said magneto-resistive region and said domain control regions continuously;

30 patterning said electrode layer to form a pair of electrodes on said pair of domain control regions respectively, such that said electrodes extend to each other over said magneto-resistive region with a gap formed between said electrodes, said step of  
35 patterning being conducted by applying an etching process to said electrode layer until said oxidation-resistant conductive layer is exposed at said gap; and

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patterning said oxidation-resistant  
conductive layer until said cap layer is exposed at  
said gap.

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9. A method as claimed in claim 8, wherein  
said step of depositing said oxidation-resistant layer  
10 comprises the step of depositing an Au layer as said  
oxidation-resistant layer, and wherein said step of  
patterning said oxidation-resistant layer comprises a  
reactive-ion etching process.

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10. A method as claimed in claim 8, wherein  
said step of depositing said cap layer comprises the  
20 step of depositing a Ta layer as said cap layer, and  
wherein said step of patterning said cap layer  
comprises an ion milling process.

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11. A method as claimed in claim 8, wherein  
said step of patterning said oxidation-resistant layer  
and said step of patterning said cap layer are  
30 conducted by an ion milling process.

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12. A method as claimed in claim 8, wherein  
said step of patterning said oxidation-resistant layer  
and said step of patterning said cap layer are

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conducted by using a common resist mask.

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